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Adobe Creek

# ADOBE CREEK FLOOD CONTROL PROJECT
# HIGHWAY 101 TO EL CAMINO REAL

## FOR ENGINEER'S REPORT

### Geologic and Hydrogeologic Setting

Adobe Creek drains a relatively small area along the northwest side of Santa Clara Valley. Its headwater originates in the Santa Cruz Mountains and enters the valley floor at the City of Los Altos at an elevation of about 250 feet above sea level, then slopes down to the northeast to enter San Francisco Bay via Charleston Slough.

The study area, within the valley floor, extends from El Camino Real to U. S. Highway 101. Thick deposits of unconsolidated alluvial fill washed down from the mountains into the valley floor area and aggregate to a maximum thickness in excess of 1,500 feet. The alluvial fill, which comprises the groundwater basin, has been deposited as gently sloping granular alluvial fans, splaying out onto the valley from the streams as they emerge into the valley from the mountains and as basin and shallow marine deposits. The basin and shallow marine deposits are deposited at the distal toe of the fan and in the flat interior baylands area of the valley and they consist predominantly of fine grained deposits, silt and clay.

The project area occurs within the mid to lower alluvial fan surface through basin and shallow marine deposits of the baylands. Within this reach, the principal or lower aquifer zone (below depth of 150 feet) is confined. The upper aquifer zone which includes aquifers within 100 feet of the land surface is either unconfined (water table condition) or confined. Groundwater recharge to the lower aquifer zone is through lateral aquifer connections from the elevated portions of the alluvial deposits which comprise the unconfined forebay portion of the basin. The upper aquifer zone is recharged both laterally from the forebay and from seepage to the water table from surface sources.

## Historic Stream Channel and Improvements

The channel of Adobe Creek, as it meandered down the surface of gently sloping alluvial fan, appeared to be confined to well-defined incised channel. As it crossed Charleston Road, the channel lost its definition as the land surface flattened out in the basin and marine baylands deposits. Flows seemed to have overflowed and eventually became tributary to Permanente Creek in the baylands area. Permanente Creek then discharged into San Francisco Bay through Charleston Slough.

In order to improve flood control protection, the channel of Adobe Creek downstream of El Camino Real was excavated to a larger trapezoidal section. This improvement extended beyond the existing originally defined portion of the channel, as a new and direct extention channel to Charleston Slough. The excavated section from El Camino Real to Louis Road has been concrete lined. Permanente Creek had been diverted as to enter San Francisco Bay through Mountain View Slough.

The current project proposes the expansion of flow capacity of the present course by enlarging the cross-sectional area through excavation and section modification and by concrete lining of the entire reach.

## Soils and Foundation Characteristics

The surficial soils beneath the outer alluvial fan (El Camino to Waverly Street) is referred to as Pleasanton gravelly loan. These are soils which range from good to moderately slow drainage in character.

From Waverly Street to Middlefield Road, the land surface gradient reduces considerably and the surface is underlain by clay of the Clear Lake soil series. Salinity of these soils ranges from none to moderate. These soils developed on the lower alluvial fan - basin deposits surface.

From Middlefield Road to East Meadow Drive, the land surface becomes the falt baylands area underlain by the Sunnyvale silty clay series. Salinity ranges from none to low.

From East Meadow Drive to U. S. Highway 101, the surface soil belongs to the Alviso soil series which consists mostly of highly saline, soft clay deposits. These occur in areas affected by tidal falts and sloughs.

Finger drains may have to be constructed behind the proposed concrete lining within the lower reaches of the project area due to the anticipated shallow depth to groundwater.

## Land Subsidence and Saltwater Intrusion

Land subsidence occurred at varying rates from about 1920 to 1969. Subsidence resulted as artesian pressures in the lower aquifers were reduced by overdraft pumping of the groundwater basin. Land subsidence expresses itself at the surface as a broad, imperceptible sagging of the surface, encompassing an area of many square miles.

One of the centers of subsidence is located in Mountain View at the intersection of U. S. Highway 101 and Highway 237, where about 7 feet of subsidence was noted to have occurred between 1934 and 1967 (Poland and Ireland, 1969). The total amount is more since subsidence started about 1920 and continued to 1969. The project area is northwest of the maximum trough and had subsided about 1 foot at El Camino Real to a maximum of 5 feet at U. S. Highway 101 between the years 1934 and 1967. Since the axis of the trought of maximum subsidence extends on a northwesterly axis along Highway 101 from the center of subsidence in Mountain View, the lowest sag point as a result of subsidence would be at Highway 101 along Adobe Creek, with lesser amounts of subsidence progression in each direction. Levees had to be constructed along the bayfront and along stream channel banks through the areas that had subsided below sea level at the baylands. Accumulation of sediments may begin to pose problems in these portions that sagged below sea level.

Should overdrafting of the basin resume in the future, land subsidence may continue. If this occurs, bayfront and stream channel levees would have to be heightened along the baylands and the sedimentation would be aggravated along the portions that sagged below sea level.

Because the bayfront and baylands subsided below sea level, saltwaters of the Bay began incurring farther upstream as tidal flows. This, along with groundwater pumping of the shallow aquifers, has induced saltwater intrusion of shallow aquifers beneath the baylands portion of the project area. This, in itself, may not affect the flood aspects of the project, but may affect the future operation of the Palo Alto Flood Basin and its effect upon existing conditions of saltwater intrusion.

### Groundwater Levels

The depth to groundwater in the upper aquifer zone along the project varies considerably ranging from about 30 feet at El Camino Real to within 5 feet at Highway 101 below the prevailing land surface. These ranges vary somewhat with seasonal and long-term climactic fluctuations.

### Seismicity

Santa Clara Valley lies between the active San Andreas fault in the Santa Cruz Mountains and the Hayward-Calaveras fault system which occurs along the east side of the Valley and in the Diablo Range. It is thus considered to be located in a highly seismically active area. The San Andreas fault passes approximately 10 miles southwest of El Camino Real.

The effects of ground shaking would present immediate danger to the stability of the levee system in the baylands area. Soils are weak and the water table is at near surface in the baylands, which makes it the area most likely to be strongly affected by seismic ground shaking. Damage to the channel would be in the form of bank instability conditions which might result in slumping, lateral spreading and/or sloughing of the banks and levees.

Seismic shaking of the general surface in the mountains and upstream watershed areas may also induce landsliding, lateral spreading and sloughing of the bank which may contribute a large sediment load to the sagged portion of the channel in the baylands, to aggravate an existing problem.